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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PHAM, HOAI V

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 09/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/063,331

Applicant(s)

FRIED ET AL.

Examiner

Hoai V Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 20-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 11 is/are allowed.
- 6) ☒ Claim(s) 1-9 and 20-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 19 June 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 2, 22 and 28 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 2 and 22, the phrase “a first interconnect connected to one of the top surface, the first side surface, and the second side surface of the Fin structure” is not described in the specification and the figure.

Claim 28, the phrase “wherein a FinFET is disposed on the substrate, the FinFET having a gate electrode coupled to said conductor structure” is not described in the specification and the figure.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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4. Claims 1, 3, 4 and 9, are rejected under 35 U.S.C. 102(b) as being anticipated by Ting [U.S. Pat. 5,838,032].

With respect to claim 1, Ting (fig. 6, cols. 3-5) discloses a capacitor formed on a substrate (21), comprising:

a Fin structure (23) having a top surface and a first side surface opposite a second side surface, said Fin structure including a single-crystal semiconductor material (see col. 3, lines 60-61 and col. 4, lines 42-44);

an insulator structure (24) adjacent the top surface of the Fin structure (see col. 3, lines 65-67); and

a conductor structure (25) adjacent the insulator structure (see col. 3, lines 65-67), wherein the conductor structure partially but not totally overlays the Fin structure, and wherein a thickness of the conductor structure is within a thickness of the Fin structure, said thickness of the Fin structure being a distance between the first and second side surfaces of the Fin structure, said thickness of the conductor structure being oriented in a same direction as said thickness of the Fin structure, said insulator structure comprising a single insulative material distributed from the top surface of the Fin structure to a bottom surface of the conductor structure (see fig. 6).

With respect to claim 3, Ting discloses that a second interconnect (30) connected to the conductor structure (25) (see fig. 6 and col. 4, lines 15-19).

With respect to claim 4, Ting discloses that the conductor structure (25) includes a conductive material consisting of a metal (see col. 4, lines 44-46).

With respect to claim 9, Ting discloses that the single insulative material is silicon oxide (see col. 3, lines 65-67).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1, 3, and 5-9 rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. [U.S. Pat. 6,407,442] in view of Ting [U.S. Pat. 5,838,032].

With respect to claims 1 and 7, Inoue et al. (fig. 2, cols. 4-6) discloses a capacitor formed on a substrate (101), comprising:

a Fin structure (103) having a top surface and a first side surface opposite a second side surface, said Fin structure including conductivity enhancing dopant ions in a semiconductor material (see col. 4, lines 62-63);

an insulator structure (144) adjacent the top surface of the Fin structure (see col. 4, line 64); and

a conductor structure (105a) adjacent the insulator structure (see col. 4, lines 64-65), wherein the conductor structure partially but not totally overlays the Fin structure, and wherein a thickness of the conductor structure is within a thickness of the Fin structure, said thickness of the Fin structure being a distance between the first and second side surfaces of the Fin structure, said thickness of the conductor structure being oriented in a same direction as said thickness of the Fin structure, said insulator structure comprising a single insulative material distributed from the top surface of the Fin structure to a bottom surface of the conductor structure (see fig. 2).

Inoue et al. does not disclose the Fin structure including a single-crystal semiconductor material. However, Ting discloses that the lower electrode (23) can be formed of single-crystal semiconductor material (see col. 4, lines 42-44). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to select single-crystal semiconductor material as known materials, as taught by Ting into the device of Inoue et al. to form the lower electrode. Moreover, selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

With respect to claim 3, Inoue et al. discloses that a second interconnect (107) connected to the conductor structure (105a) (see fig. 2).

With respect to claims 5-6, Inoue et al. does not teach the exact thickness and height range of their Fin structure, as claimed by Applicant. However, the thickness and height range would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

With respect to claim 8, Inoue et al. discloses that a FinFET (110, 111) is disposed on the substrate, the FinFET having a gate electrode (105) coupled to said conductor structure (see fig. 2 and col. 5, lines 10-18).

With respect to claim 9, Inoue et al. discloses that the single insulative material (104 same as layer 960 in fig. 20) is silicon oxide (see col. 10, lines 54-55).

8. Claims 20 and 22-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Akamatsu [U.S. Pat. 6,121,650] in view of Ting [U.S. Pat. 5,838,032].

With respect to claims 20, Akamatsu (fig. 1, cols. 3-4) discloses a capacitor formed on a substrate (1), comprising:

a Fin structure (8) having a top surface and a first side surface opposite a second side surface (see fig. 1);

an insulator structure (14) adjacent the top surface of the Fin structure (see fig. 1); and

a conductor structure (15) adjacent the insulator structure (fig. 1), wherein the conductor structure overlays the Fin structure, wherein a thickness of the Fin structure is within a thickness of the conductor structure, said thickness of the Fin structure being a distance between the first and second side surfaces of the Fin structure, said thickness of the conductor structure being oriented in a same direction as said thickness of the Fin structure, said insulator structure comprising a single insulative material distributed from the top surface of the Fin structure to a bottom surface of the conductor structure (see fig. 1).

Akamatsu does not disclose the Fin structure including a single-crystal semiconductor material. However, Ting discloses that the lower electrode (23) can be formed of single-crystal semiconductor material (see col. 4, lines 42-44). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to select single-crystal semiconductor material as known materials, as taught by Ting into the device of Akamatsu to form the lower electrode. Moreover, selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

With respect to claim 22, Ting discloses that a second interconnect (30) connected to the conductor structure (25) (see fig. 6 and col. 4, lines 15-19).

With respect to claim 23, Ting discloses that the conductor structure (25) includes a conductive material consisting of a metal (see col. 4, lines 44-46).

With respect to claims 24-25, Akamatsu does not teach the exact thickness and height range of their Fin structure, as claimed by Applicant. However, the thickness and height range would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

With respect to claim 26, Ting discloses that the single insulative material is silicon oxide (see col. 3, lines 65-67).

9. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akamatsu [U.S. Pat. 6,121,650] and Ting [U.S. Pat. 5,838,032] as applied to claim 1 above, and further in view of Sato et al. [U.S. Pat. 6,309,945].

Akamatsu discloses all the limitation as claimed above except for the substrate comprises a SOI substrate. However, Sato et al. discloses that the substrate can be used of SOI substrate to prevent strongly coarsening of the porous structure at the high temperature in the epitaxial growth and the substrate bonding operation (col. 3, lines 58—67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use SOI substrate as taught by Sato et al. into the device of Hanagasaki in order to prevent strongly coarsening of the porous structure at the high temperature in the epitaxial growth and the substrate bonding operation and applicable to various high-performance electronic devices.

Allowable Subject Matter

10. Claims 10-11 are allowed.

Response to Arguments

11. Applicant's arguments with respect to claims 1-9 and 20-28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

13. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoai V Pham whose telephone number is 703-308-6173. The examiner can normally be reached on 7:30A.M. - 6:00P.M..

15. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 703-308-4918. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

16. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

HP
Hoai Pham
August 29, 2003



LONG PHAM
PRIMARY EXAMINER